1874.

BOROUGH OF CARDIFF.

THE

OFFICER OF HEALTH'S REPORT

ON

Sanitary Condition of Cardiff,

DURING THE YEAR 1873.

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TO THE

CARDIFF LOCAL BOARD OF HEALTH.

Cardiff, January, 1874.

GENTLEMEN,

I have to-day to bring before your notice, my report on the sanitary condition of Cardiff during the year 1873; and in doing so, I may observe, that the Sanitary Act of 1872 for the first time placed the whole kingdom under complete sanitary supervision, and that under the provisions I was re-elected your Medical Officer of Health.

At the commencement of this new era, one of the objects sought to be obtained, was, that for the information of the Local Government Board, a report should be furnished by each Medical Officer of the sanitary condition of the district under his charge. This, together with the great change which has of late years taken place in many of the essential features of the town, makes it necessary I should direct your attention to the various circumstances which may exercise either immediate or a collateral influence on the public health of the inhabitants.

POPULATION.

The estimated population of Cardiff in the year 1873 was 41,510. It has attained this number at a ratio of increase which has varied with different intervals of times, as is indicated by the several census returns since 1801—these being as under.

Census.	Population.
1801	1,870
1811	2,557
1821	3,521
1831	6,187
1841	10,077
1851	18,351
1861	32,954
1871	39,536

Between the years 1841 and 1851, after the construction of the West Bute Docks, and the completion of the Taff Vale Railway, the town gave indications of becoming an important seaport, and the centre of a large population; and although the decennial period between 1861 and 1871 does not show the same proportionate increase, as during the previous ten years, this has arisen from the circumstance, that the house accommodation of Cardiff is unequal to the requirements of the town; that the constant immigration of labourers who are attracted here by our extensive labour fields, and who, unable to obtain houses, are obliged to seek them in the immediate suburbs. This can be understood by a reference to the following illustration of the concurrent growth of Cardiff, Roath, and Llandaff, during the periods alluded to.

Census.	Cardiff.	Roath.	Llandaff, including Canton and Upper and Lower Grangetown.
1851	18,351	312	1,821
1861	32,954	3,044	6,585
1871	39,536	7,991	11,903

From this it will be seen that in 1851 Roath and Llandaff first assumed the appearance of becoming populous districts. Between 1861 and 1871 the Board of Health for the Canton District was formed, and it is separated from Llandaff in the last census return. The population of Llandaff is divided thus—Llandaff, 1,142. Canton, 7,059. Upper and Lower Grangetown, 2,189. The hamlet of Gabalva, 677. The hamlet of Ely, 749, and Fairwater, 87.

From these statistics it may be seen that the Local Boards of Health of Cardiff, Roath, and Canton, with Upper and Lower Grangetown combined, in 1871 formed a total population of 56,675—a population essentially our own, and divided only by the arbitrary boundaries of the several parishes. This population will necessarily continue to increase at the same if not at a greater rate—it must, therefore, be a matter for serious consideration, and of grave interest to all, whether a district topographically and intimately united for sanitary purposes, should be governed by three separate Boards, each acting distinctly, independently, and by a want of uniformity of system destroying the efficiency of the whole, however perfect each in itself may be.

THE PORT SANITARY AUTHORITY.

During the past year, in consequence of a threatened introduction of cholera into this kingdom, your Board was by a provisional order required to exercise temporarily the powers of a Port Sanitary Authority. The vast yearly increase of the shipping which arrives here, together with the circumstance that almost all vessels of considerable tonnage, especially foreign vessels, are propelled by steam, and, therefore, make rapid passages, must at times expose this town to the danger involved in the introduction of serious epidemic disease, it is, therefore, highly important that a strict surveillance should always be maintained over vessels arriving from infected ports. The advantage of such a surveillance has been practically illustrated during the last few months, as from the enquiries made by the quarantine officers we ascertained the existence of seven cases of small-pox on board vessels arriving here. On

these cases being reported to me, although the same quarantine regulations could not be applied to these, as to vessels whose crews had suffered from cholera, or hailed from suspected ports—yet, by the willing co-operation of the Dock Authorities, whose valuable assistance I am glad to acknowledge, I have been enabled to get the sick removed to the small-pox hospital, the vessel fumigated and disinfected, and the communication from the shore limited to the absolute necessity required for the proper transaction of the business of the ship, thus preventing the extension of the disease into the town.

As bearing on this point, I have been permitted by the kind assistance of Mr. T. S. Miller, Collector of H.M. Customs, to obtain the following statement of the number of vessels with the amount of tonnage which have annually arrived here during the last 27 years.

The number of Vessels with amount of tonnage which entered the port of Cardiff annually, from 1847 to 1873 inclusive—

Years.	No. of Vessels Inwards.		Total number of Vessels Foreign and Coastwise.	Tonnage.		Total Tonnage of Foreign Trade and Coastwise Inwards.
	Foreign.	Coastwise.		Foreign.	Coastwise.	
1847	633	5,787	6,420	77,164	367,804	444,968
1848	964	6,522	7,486	145,772	426,437	572,199
1849	1,182	6,166	7,344	182,981	397,892	580,873
1850	1,366	6,314	7,680	236,383	429,893	665,376
1851	1,387	6,490	7,877	260,916	449,753	710,669
1852	1,711	6,212	7,923	331,389	431,696	763,085
1853	2,113	6,200	8,313	428,403	447,836	876,239
1854	2,688	6,304	8,992	502,951	461,115	964,066
1855	2,720	5,662	8,382	607,136	415,781	1,022,817
1856	3,106	6,018	9,124	688,477	446,442	1,134,219
1857	3,082	6,256	9,388	752,336	453,009	1,205,345
1858	2,969	6,406	9,375	650,344	487,978	1,138,322
1859	3,274	6,988	10,262	186,118	548,631	1,334,749
1860	3,528	7,379	10,907	911,442	609,064	1,520,506
1861	3,603	7,933	11,536	879,778	675,355	1,555,133
1862	4,292	7,971	12,263	1,047,400	692,197	1,739,597
1863	4,622	7,715	12,337	1,135,090	684,009	1,819,099
1864	4,146	7,768	11,914	1,120,754	655,287	1,776,041
1865	3,879	7,678	11,557	1,127,560	662,723	1,790,283
1866	4,335	7,573	11,908	1,379,350	646,655	2,026,005
1867	4,466	7,397	11,863	1,456,110	630,438	2,086,548
1868	4,632	6,962	11,594	1,578,619	591,205	2,169,824
1869	4,808	6,995	11,803	1,698,570	607,185	2,385,755
1870	4,736	7,241	11,977	1,786,690	599,443	2,386,133
1871	4,234	6,919	11,153	1,637,725	588,011	2,225,736
1872	4,942	6,994	11,836	1,951,897	600,805	2,552,702
1873	4,694	6,674	11,368	1,920,410	640,089	2,560,499

The following were the precautionary measures adopted to prevent the introduction of cholera into the port:—

H.M.'s Commissioners of Customs, acting under an order in Council and sanctioned by the Treasury, employed a steam vessel, with a

Quarantine Officer, to visit all foreign ships on arrival in the Roads. This Officer's duty was to put certain questions, prescribed on printed form and approved by the Commissioners, for the purpose of ascertaining whether the ship had sailed from an infected port, whether any death from cholera had taken place while on its passage, whether any person was suffering from that disease, or that there was anything on board which had been exposed to the danger of infection. These replies were then to be signed by the captain, who was liable to a severe penalty if he gave wrong information. In the event of the replies being deemed by the Officer unsatisfactory, the ship was detained in quarantine until notice could be given to the Sanitary Authority, and the ship visited by me. I then examined the log book, individually examined all on board, and adopted such means as the exigencies of the case required to prevent the spread of the disease. It was necessary that such visits should be made within 12 hours of the arrival of the ship. From the 9th of September, 1873, until March 25th, 1874, this system was maintained in force.

THE CHARACTERISTICS OF THE SANITARY DISTRICT.

The District of the Cardiff Local Board of Health comprises an area of 2,155 acres, exclusive of 166 acres covered with water. This area has, to a considerable extent, been built over, or appropriated to the construction of large Docks, and other important works. Of the remainder a large portion is devoted to the Castle with its private grounds, and another portion is reserved for special purposes, so that little is now available for building.

The Town of Cardiff is built on a flat—very little above the level reached by the ordinary rise of the sea. The old portion of the town is but slightly raised above the general level, the highest part being near the Town-hall, where it is not more than 10 feet above that level. The general surface of the flat is about 2 feet below the spring tide level, and about 8 feet above the level of high water neaps.

The substratum of the old or northern part of the town as far as Custom House Street is gravel. From this line down to the sea the gravel is overlaid by black clay. The clay at the shore line is about 30 feet deep, becoming thinner and thinner as it approaches Custom House Street, when it disappears. In the upper part of the town the gravel is from 6 to 8 feet deep; under this is a hard red marl, which holds up the water. Previous to the carrying out a system of drainage in 1853, the health of the inhabitants suffered from this circumstance.

The ownership of the soil is vested in few hands, and land for building is to be obtained only on leasehold grants; this is eagerly sought after, and commands a high ground rent, causing a class of houses to be erected for the occupation of labourers, of a size unusually large for such a purpose.

HOUSE ACCOMODATION.

The rapidity with which houses have been built is shewn by the census returns of 1851, 1861, and 1871. I have distinguished the number of what may be called the population proper, or those belonging

to the town, from the seamen who sleep on board their ships. I also give the average number of inmates to each house.

Census Years.	Number of inhabited Houses.	Population Proper and Seamen.	Population		Mean average number of inmates proper to each House.
			Seamen.	Proper.	
1851	2,565	18,351	2,086	16,265	6·3
1861	4,606	32,954	1,721	31,233	6·0
1871	5,339	39,536	4,192	35,344	6·6

The mean average proportionate number of inmates to each house throughout the kingdom is 4·9. In towns it rarely exceeds 5·5, in Cardiff it has not been less than 6·, and in 1871 was 6·6. This arises from two causes; first, as stated above, the size of house occupied by the labouring classes, and secondly, the high rents. The latter circumstance necessitates the occupiers of houses to sub-let their apartments, and hence the system of over-crowding, which requires constant and firm supervision to prevent serious evils resulting.

I may here instance the rent of houses in certain streets chiefly occupied by Irish labourers, whose weekly earnings vary from 10s. to 18s. per week.

Streets.	Weekly Rent.	Average number of Inmates in each House.	Greatest number found on a visitation.
	s. s. d.		
Tyndall Street	8 to 15 0	15	32
Thomas Street	6 to 9 6	12	15
Pendoylan Street... ...	6 to 9 6	11	15
North William Street...	6 to 9 6	11	16
Ellen Street...	6 to 9 6	12	16
Herbert Street	9 to 12 6	16	23

I have recently ascertained the rent paid for 550 houses, occupied by Irish labourers. The rents are paid weekly; but in the aggregate amount yearly to the undermentioned sums:

Less than £10 yearly	79
Above £10 and less than £15	116
„ £15 „ £20	149
„ £20	206

These houses come under the denomination of Lodging-houses, and comprise a list, which is constantly under the supervision of the Inspector of Lodging-houses. They have all been examined, and the dimensions of rooms taken, of which a proper register is kept. According to the cubic space of each sleeping apartment is the number of inmates allowed to each house—350 cubic feet being the minimum space allowed for each inmate. The bedrooms are forbidden to be occupied during the day, when the windows are required to be kept open; the bed-clothes are to be thrown back over chairs at foot of bed; the walls of rooms to be limewashed, and the floors cleansed as often as necessary. No

accumulation of ashes or refuse of any kind is permitted, nor are animals allowed to be kept in the back yard. The water closets and house drains are constantly examined.

The Inspector calls on me at 9 o'clock every morning to report the result of his visits made during the day or night previous, detailing the number of inmates found in the night in each house, and the condition of the house and back yard in the day.

SCAVENGING.

The removal of house refuse and ashes (as also the scavenging of the streets) was formerly done by contractors, but as the system did not work satisfactorily, it is now executed by the Board, and is effected in the following manner :—

Occupiers of houses are required to place before their doors every morning a box or receptacle, containing the ashes or refuse they desire to be removed. This is collected by the dust carts which pass through each street daily. These carts perambulate the principal streets, or those where traffic is great, between the hours of 7 and 9 a.m. The other streets throughout the day until 5 p.m. No objection to this arrangement is made on the part of the occupiers, who readily co-operate with the officials, and the plan works well.

The cost of this operation (including the scavenging and watering of the streets) is as follows :

The refuse matter is carted to certain depôts, most convenient for deposit and sale ; when sold it realises from 1s. to 1s. 3d. per cubic yard.

The carts employed belong to the Board and are 14 in number. The horses are hired at 9s. each per day, but this sum also secures the services of the driver. About 14 additional men are employed at the cost of the Board ; these latter have to load the carts, and scavenge, and assist in watering the streets.

The approximate amount of cost for one year is as follows :

	£	s.	d.
Horses and Drivers hired at 9s. per day for removing ashes, scavenging and collecting, and for watering the streets	1,733	14	9
Water and flushing	48	0	10
Repairs	166	1	11
Materials, shovels, brooms, &c, ...	50	17	0
Wages to additional employed in scavenging, watering streets &c.	562	16	6
	2,561	13	0
Less received for sale of ashes and refuse	195	0	0
Total Cost	£2,366	13	0

THE DRAINAGE.

The following is a description of the drainage of the town as it exists at present. In making this outline I am greatly indebted to Mr. Waring, your surveyor, who has given me his valuable assistance.

The outfall of the system as planned by Mr. Hawkshaw was fixed at the eastern boundary of the District, as being the most distant from any existing or probable buildings, and, as being to the leeward of the prevalent winds. It has, however, been removed still further to the east by the Trustees of the Marquis of Bute, the original site being required to enable them to carry out their scheme for the extension of the dock accommodation of the Port.

The gradients or rates of inclination at which the sewers constructed were governed by the levels of the basement floors, as well as by the levels of the canal, tramways, and sunk roads which it was necessary to pass under.

Commencing at the new outfall, a sewer of 10ft. diameter and 4,787ft. long, discharging into a Tidal Basin, with wrought iron tidal doors, and an additional length of 1,000ft., with 8ft. diameter, extending to east end of Tyndall Street, forms an outfall sewer and storm reservoir sufficient for the present requirements of the District.

The circumstance of the new sewer being laid at a lower level than the original outfall sewer led to an extension of the lower level through Tyndall Street, into which sewers from Newtown, Ellen Street, Thomas Street, &c., now discharge the fluid matter. These sewers being lowered 15in., are kept in much better condition, and practically free form deposit.

A further extension of this low level sewer to Bute Street, with a connection of the Bute Town main sewer, would act very beneficially on present sewers in Bute Street and Bute Town districts. At the east end of Tyndall Street, the new outfal lreceives the two mains of Tyndall Street and Davies Street. From this junction, the Tyndall Street sewer, 4ft. 0in. by 2ft. 9in., runs westward 755 yards to west end of Herbert Street, at Bute Street, receiving the new southern main sewer from Bute Town and an upper district main from Bute Street, northward. From this point, a sewer of 3ft. 9in. by 2ft. 6in., reaches to the east end of Charlotte Street, receiving from all sewers West of Love Lane, and from Charles Street to St. Mary Street and Temperance Town. This sewer is continued 3ft. 0in. high up Charlotte Street, under the Glamorganshire Canal at St. Mary Street, and through Angel Street, up to the Cardiff Arms Hotel at Broad Street, where the flushing-water is received.

The various rises and rates of inclination of this sewer above the outfall are as follows :—

	ft.	in.	Rate of Inclination per mile. ft.	in.
To Tyndall Street from outfall	5	0	4	0
To Herbert Street from Tyndall Street	1	10	4	3
To Charlotte Street from Herbert Street	1	5	10	8
To Glamorganshire Canal from Charlotte St.	1	2		
To Cardiff Arms from Charlotte Street	7	8	16	0

The current in outfall sewer East Moors	10	0	is at the rate of	1	3 per hour.
„ Tyndall Street sewer	4	0	by 2ft. 9in.	1	5 „
„ Bute Street sewer	3	9	by 2ft. 6in.	1	0½ „

This line of sewer is practically free from deposit,

The second main sewer, 4ft. 0in. by 2ft. 9in., runs from east end of Tyndall Street directly north to Newport Road, near Infirmary, turning west from that point with 3ft. 0in. by 2ft. 0in. up to Crockherbtown, under Bute Dock Feeder and Glamorganshire Canal, and joining sewer No. 1 at Angel Street. At the turn near the Infirmary, this sewer receives all sewage from Tredegarville and part of Plucca Lane (now Castle Road), and in Davies Street at Kite Street, the sewage from Augusta Street flows in. In this sewer no practical deposit takes place to the Taff Vale Railway Station, but hence to Park Place sand deposit accrues, necessitating the additional side entrance between the Railway Bridge.

The various rises and inclination of this sewer above outfall are as follows :—

			Rate of inclination per mile.	
	ft.	in.	ft.	in.
To Newport Road from Tyndall Street	3	10	8	5
To Dock Feeder from Newport Road	1	2		
To Charles Street from Dock Feeder	0	3	4	7
To Glamorganshire Canal from Charles Street	0	10		
To Angel Street from Canal	4	9	61	8
			16	6

A third main sewer, 3ft. by 2ft., runs from Davies Street, No. 2 sewer through Victoria and Adam Streets, under Dock Feeder at Bute Terrace, up David Street and Charles Street, being connected with Crockherbtown sewer at north end of Charles Street, the rises and gradients of this sewer are

			Rate of Inclination per mile.	
	ft.	in.	ft.	in.
To Victoria Street from Outfall	6	4		
To Bute Terrace from Victoria Street	2	6	7	7
To Crockherbtown from Bute Terrace	1	6	4	8

Into these main sewers all branch sewers from the intermediate streets, and all sewers lying northwards of the Docks, are discharged; the dimensions of branch sewers being 3ft. 0in. by 2ft. 0in., and the gradient varying from 14ft. per mile to 5ft. per mile, according to locality.

The Bute Town main sewer discharges into the main sewer first diverted at Herbert Street, comprising a brick sewer 3ft. 9in. by 3ft. 6in. up to Loudoun Square, and from that point to the sea at Penarth Terrace near the Old Sea Lock, of 3ft. 0in. by 2ft. 0in. Penarth Terrace being the commencement of the sewer, a connection is made with the sea, at a level, which allows the admission of flushing tidal water at high water of equinoctial tides.

The rises of the sewer from the point of discharge at Bute Street and Herbert Street are as follows :—

			Rate of Inclination per mile.	
	ft.	in.	ft.	in.
To Loudoun Square from Herbert Street	1	3	3	6
To Patrick Street from Loudoun Square	0	9		
To Mary Ann Street from Patrick Street	2	6	4	10
To Penarth Terrace from Mary Ann Street	0	11		

In this sewer, a deposit of sand exists between the Junction Dock, and Loudoun Square, varying from 9 to 6 inches on the invert, and southward of Loudoun Square, about 3 inches.

This main receives the drainage of all streets and houses north of Patrick Street, with the exception of the basements in Bute Road, which are at a lower level; also, the flow from Mount Stuart Square and the southward district west of Adelaide Street.

A connection of this sewer, with an extension of Tyndall Street low-level sewer at Crichton Street, would materially facilitate the discharge from the Bute Town district.

The northern part of your district, east of the Taff Vale Railway, is provided for by a main sewer laid about three years ago from Tredegarville through lands partially built on and extending up to Cathays Terrace as far as buildings have been erected. This length of the sewer from the Newport Road is 1,700 yards, at an average depth of 15 feet below the surface, and having an inclination of 1 in 200 or 26 feet per mile. The internal dimensions are 3ft. 3in. by 2ft. 0in. Branch sewers of similar size, and with generally the same rate of inclination, discharge into this sewer from Castle Road (Plucca Lane), Woodville Road, and adjacent streets.

The rate of inclination and inflow of subsoil water from an under bed of gravel keep these sewers free from deposit without artificial flushing.

From the northern part of this sewer a line of sewer may easily be carried across the Grange Farm and Taff Vale Railway to Blackweir, which requires to be dealt with.

The Bute Town branch of the sewers, north of Loudoun Square, are flushed from a tank supplied by the Water Company's mains in the Square, and are, as a rule, free from deposit except at their junctions with the main sewer, the body of water in which checks the flow of the lateral sewers at the point of delivery and occasions accumulations which it is necessary to scrape into the main sewer and wash away by flushing about twice a year.

The size of the sewers adopted is such as to admit the passage of a man through them, and the junctions and side entrances are so arranged as to afford all practicable facilities for the purpose.

The annexed table shews particulars of sewerage and deposit in sewers as taken in 1867, and in the current year. The observations being made at low water, and when artifical flushing is not in operation.

CARDIFF SEWERS.

DEPTH OF SAND, SEWAGE MATTER, AND WATER IN STREET SEWERS,

DATE OF OBSERVATION, 1866 AND 1874.

POSITION.	HARD SAND. Inches.		SEWAGE MATTER. Inches.		WATER. Inches.		TOTAL. Inches.		Increase.	Decrease.	Current
	1866.	1874.	1866.	1874.	1866.	1874.	1866.	1874.	Inchs	Inchs	
Adam Street	4	3	...	...	4	4	8	7	...	1	
Adelaide Street	2	1	...	...	3	5	5	6	1	...	
Bute Street, at Charlotte Street	5	4	...	...	3	4	8	8	...	...	
Do., opposite Rothsay Castle	...	7	...	...	...	2	...	9	...	...	
Do., opposite Hannah Street	...	...	...	...	...	...	...	...	...	...	
Do., at Cabstand	...	...	...	...	...	14	...	14	...	...	
Bute Terrace, East end	...	...	...	...	5	2	5	2	...	3	
Do., West end	5	5	1	...	3	4	8	9	1	...	
Brewery Street	9	5	...	...	4	6	13	11	...	2	
Charles Street	2	4	...	...	9	2	11	6	...	5	
Christina Street	...	7	...	5	...	...	...	12	...	...	
Crockherbtown (Paradise Place)	3	4	...	...	3	4	6	8	2	...	
Duke Street	...	...	...	...	...	2	...	2	...	...	
Davis Street	3	3	. .	...	7	6	10	9	...	1	
Dudley Street	3	4	2	...	3	4	6	8	2	...	
Eleanor Street	3	7	6	...	1	5	4	12	8	...	
Ellen Street	...	1	...	...	...	4	...	5	...	...	
Guildford Street	...	1	...	...	...	1	...	2	...	...	
Hannah Street	...	7	...	...	...	4	...	11	...	...	
Herbert Street	4	6	...	...	12	7	16	13	...	3	
Hayes	2	4	...	...	2	1	4	5	1	...	
Havelock Street	...	5	...	...	...	3	...	8	...	...	
Ivor Street	6	6	...	...	4	3	10	9	...	1	
Kite Street	4	4	2	...	2	2	6	6	...	...	
Luton Place	...	...	...	...	2	2	2	2	...	...	
Loudoun Place, South	6	6	1	...	4	3	10	9	...	1	
Do., North	3	8	...	...	13	4	16	12	...	4	
Mary Ann Street	7	4	...	...	2	2	9	6	...	3	
Moira Place, West	...	...	...	...	3	...	3	...	...	...	
Moira Crescent	...	6	...	...	...	2	...	8	...	...	
St. Mary Street	...	...	...	...	2	4	2	4	2	...	
Mount Stuart Square	2	...	2	...	3	6	3	6	3	..	
Newport Road (Railway Bridges)	3	8	2	...	4	3	7	11	4	...	
Plucca Lane	3	2	...	...	3	2	6	4	...	2	
Penlline Street	...	3	...	...	...	1	...	4	...	...	
Parade, at East Grove	...	...	...	...	...	...	...	...	...	...	
Park Place	...	...	...	...	2	3	2	3	1	...	
Park Street, East end	...	9	...	...	...	3	...	12	...	...	
Pendoylan Street	4	...	...	...	4	3	4	3	...	1	
Plucca Lane	...	...	...	...	...	...	...	...	...	...	
Quay Street	2	4	...	...	2	1	4	5	1	...	
South Church Street	...	2	3	...	4	2	4	2	...	2	
Sophia Street (Main Sewer)	9	8	...	...	6	4	15	12	...	3	
Sandon Street	1	3	...	...	3	2	4	5	1	...	
South Wales Railway Road	...	...	...	...	2	4	2	4	2	...	
Tyndall Street, West end	..	..	...	New sewer		15	16	22	6	...	
	...	...	...	Old	,,16	7					
Do., East end	..	..	...	,,	,,	6	...	23	...	...	
	...	...	...	New	,,	17					
Tredegar Street	6	3	...	...	3	2	9	5	...	4	
Thomas Street	...	3	...	...	...	3	...	6	...	...	
Union Street	5	4	...	...	2	3	7	7	...	...	
Upper George Street	...	1	...	...	....	1	...	2	...	...	
West Bute Street, Back Road	6	3	1	...	2	4	8	7	...	1	
West Grove	1	2	...	...	3	4	4	6	2	...	
Westgate Street	...	...	...	...	...	5	...	5	...	...	
Wood Street, East end	2	4	2	...	1	2	3	6	3	...	
Do., West end	2	2	2	...	...	2	2	2	...	...	
Windsor Place	...	...	...	...	3	...	3	...	...	...	
Outfall Sewer, East Moors	...	...	...	...	22	14	22	14	...	8	
Do. do.	...	...	...	...	...	...	...	...	...	...	

Ventilation is effected by means of vertical shafts direct from sewers, and street surfaces, placed at distances of 100 yards on mains, and 150 yards on branch sewers, and a few flues have been connected with engine chimnies with beneficial results. The most effective draughts are obtained at the Gas Works which have a circular flue 18 inches in diameter, and a velocity of 1,025 feet per minute, and at Messrs. Hill and Sons, where there is a flue of 15 inches diameter, and a velocity of 430 feet per minute.

For the purpose of deodorizing, charcoal chambers have been placed at the outlets in the streets most requiring them.

Great benefit has been derived from the catch pits and flushing doors, constructed about the year 1858, in the first scheme of sewers at Paradise Place, Charles Street, Ellen Street, and other places.

A flushing tank is still required at Bute Esplanade or Penarth Terrace, for the Bute Town main sewers during the summer months.

Nearly the whole of your district is now sewered, the west side of the River Taff, Blackweir, and Harrowby Street being the only parts built on, which are not connected with your sewerage system. Houses are, however, being built on the Northern part of Tredegarville, and in Woodville, which districts contain new street not sewered. The part of the Town west of the River Taff is that most urgently requiring a proper system of sewerage, and it will be essential that all houses having only cesspools should be vigilantly examined by the Inspector of Nuisances.

METEOROLOGICAL OBSERVATIONS.

During January the Barometer was low and unsteady, and fluctuated through the limit of $1\frac{3}{4}$ inch. The maximum height was 30·24, the minimum 28·48, showing a range of 1·76. The temperature was above the average for the first 19 days to the extent of 10deg. to 14deg. The remainder of the month was somewhat below the mean. The highest reading of the Thermometer was 55deg. on the 10th, and the lowest 26deg. on the 25th, giving a total range of 29deg. The greatest daily range was 20deg., the least 3deg. The mean daily range was 10·5deg. The mean heat of the month was 41·7deg., which is 4·8deg. above the average. These figures show a mild and moderate range. The direction of the wind was more or less westerly on 22 days, and easterly on 7. With these quarters, southerly and northerly winds were combined in proportion of 18 to 10, showing an excess of south-westerly winds. The moisture in the air was large. Mean degree of humidity was 93, complete saturation being represented by 100. The rainfall was very heavy, and amounted to 4·76 inches; the greatest fall was on the 11th, being 0·91. Rain fell on 21 days.

The Barometer in February was high, with an extensive range of fluctuation. The maximum height 30·18 occurred on the 18th; the minimum 28·86 on the 26th, giving a range of 1·95, or nearly two inches. The instrument stood above 30 inches on 20 days. The temperature was low, and less than the average

on every day but nine. The highest reading of the Thermometer was 50deg. on the 22nd, the lowest 23deg. on the 2nd, showing a total range of 27deg. The greatest daily range was 22deg. on the 13th, the least variation 3deg. on the 1st and 8th. The mean daily range was 10·9deg. The mean heat of the month was 36·9deg., which is 1·8 deg. below the average. The general direction of the wind was more or less westerly on 5 days, and easterly on 23. With these quarters southerly or northerly currents were combined, in the proportion of 11 to 15. These figures show a large predominance of easterly and northerly winds. The quantity of moisture was much diminished. The mean degree of humidity was 82. The rainfall was less than that of any month since November, 1871, it amonnted to 1·17 inch. The greatest fall was 0·30 on the 24th. Rain fell on 8 days.

In March the Barometer was low the first half, and high the second. The maximum height was 30·24 on the 26th; the minimum 29·21 on the 7th, showing a range of 1·03 inch. The instrument stood below 30 inches on 17 days. The temperature of March was mild, and in excess of average every day but 9. The highest reading of the Thermometer was 63deg. on the 28th, the lowest 29deg. on the 13th, giving a total range of 34deg. The greatest daily range was 23deg. on the 28th, the least variation 6deg. on the 16th. The mean daily range was 14·8deg. The mean heat of the month 44·4deg., which is 2·8deg. above the average. The general direction of the wind was more or less westerly on 11 days, and easterly on 19. With these quarters southerly and northerly currents were combined, in the proportion of 18 to 13. These figures show a preponderance of easterly winds with southerly combinations. The air was rather damp. The mean degree of humidity was 80. The rainfall of March was above the average, amounting to 3·60 inches. The greatest rainfall in one day was 0·57 on the 6th. Rain fell on 17 days.

In April the Barometer was high. Its extreme limit of oscillation did not exceed $\frac{3}{4}$ of an inch. The maximum height reached 30·44, on the 9th and 10th. The minimum 29·68 on the 17th, giving a range of 0·76. The mercury stood above 30in. on 24 days. The Temperature of the month was, on the whole, mild, and above the average. The highest reading of the Thermometer was 73deg. on the 16th, and the lowest 28deg., on the 26th, shewing a total range of 45deg. The greatest daily range was 29deg. on the 16, the least 9deg. on the 5th. The mean daily range was 18·7deg. The mean heat of the month was 48·8deg., which is 2·6deg. in excess. The general direction of the wind was more or less westerly on 7 days, and easterly on 21. With these quarters southerly and northerly currents were combined in the proportion of 8 to 21. The quantity of moisture in the air was small, and ranged from 48 to 95. The mean degree of humidity was 68. The rainfall was extremely light, amounting only to 0·30in. The greatest fall was 0·26 on the 17th. Rain fell on 8 days.

During May the Barometer was moderately high, but fluctuating. Its maximum height was 30·46 on the 29th and the minimum 29·46 on the

17th, showing a range of one inch. The instrument stood above 30in. on 21 days. The temperature was alternately warmer and colder than the average, with a final tendency towards deficiency. The highest reading was 71deg. on the 12th, 30th, and 31st, the lowest record 31deg. on the 4th. The greatest daily range was 32deg. on the 20th, the least variation 9deg. on the 18th. The mean daily range, 20·5deg. The total range was 40deg. The mean heat of the month was 52·5deg., which is a little below the average. The general direction of the winds was more or less westerly on 20 days, and easterly on 11; with these quarters southerly and northerly currents were combined in the proportion of 12 to 18, showing a preponderance of northerly and westerly winds. The quantity of moisture in the air varied from 54 to 96. Mean degree of humidity, 74. The rainfall was 2·72. The greatest fall was 0·66 on the 4th Rain fell on 14 days.

In June the Barometer was high, except from the 10th to 16th. The maximum height was 30·39 on the 7th; the minimum 29·64 on the 12th, giving a range of ·75. The instrument stood at 30 inches or above on 22 days. The temperature of June was near average. The days were cool, but the nights warm. The highest reading of the Thermometer was 76deg. on 17th; the lowest 41deg. on 14th, shewing a range of 35deg. The greatest daily range was 30deg. on the 15th, the least 9deg. on 10th. The mean daily range, 18·4. The average heat of the month was 59·7deg. which is a fraction above the ordinary mean. The general direction of wind was more or less westerly on 19 days, and easterly on 11. With these quarters, southerly and northerly currents were combined in the proportion of 9 to 16, shewing a predominance of northwesterly winds. The quantity of moisture was moderate, the mean degree of humidity was 75. The rainfall was moderate, it amounted to 1·93in. The greatest fall on one day was 0·87 on the 29th. Rain fell on 13 days.

The Barometer in July did not indicate any extreme readings but oscillated. The maximum height was 30·24 on the 19th, the minimum 29·61 on the 13th, giving a range of 0·63. The instrument stood above 30 on 20 days. The temperature was below mean on 18 days, above on 13. The highest reading of Thermometer was 88deg. on the 22nd, the lowest 44deg. on 13th and 19th, shewing a range of 44deg. The greatest daily range was 31deg. on 21st, the least 8deg. on 25th, the mean daily range 20·4deg. The mean heat of month was 61·5deg., which is 3-10ths less than the average. The general direction of the wind was more or less westerly on 27 days, and easterly on 4. With these quarters southerly and northerly currents were combined in equal proportions. The westerly winds greatly predominated. The quantity of moisture in air varied from 97 to 55, mean degree of humidity 73. The rainfall was large, being 4.03 inches. The greatest rainfall in one day 0·96 on the 25th. Rain fell on 17 days.

In August the Barometer was moderately high and changeable to 17th, and rather low and fluctuating for remainder. The maximum height

was 30·28 on the 2nd, the minimum 29·50 on the 28th, giving a total range of 0·78. The Mercury stood below 30 inches on 14 days. The temperature of August was below average on 13 days and above on 16, and at par on 2. The highest reading of Thermometer was 76deg. on 7th and 16th, the lowest 46deg. on 17th, shewing a range of 30deg. The greatest daily range was 25deg. on 17th, the least 7deg. on 6th. The mean daily range was 16·5deg. The mean heat of month was 61·6deg, which is a fraction above average. The general direction of wind was westerly on 29 days and easterly 2. With these quarters southerly and northerly currents were combined in the ratio, 9 to 20. The quantity of moisure in air was considerable, sometimes exceeding 90. The mean degree of humidity 80. The rainfall was heavy, being 3·66 inches. The heaviest rainfall in one day was 0·70 inches on 31st. Rain fell on 17 days.

In September the Barometer was unsteady and oscillated freely, exceeding an inch and a quarter. The maximum height was 30·55 on 22nd, the minimum 29·29 on 15th, giving a range of 1·26. The mercury stood below 30 inches on 14 days. The temperature of September was cool and less than average on 20 days, the highest reading was 70deg. on 27th, the lowest 36deg. on 29th, shewing a total range of 34 degrees. The greatest daily range was 27deg. on 27th, the least 6deg. on 20th, the mean daily range was 16·5deg. The mean heat of the month was 55·1deg., which is below the average. The general direction of wind was more or less westerly on 19 days and easterly on 10. With these quarters southerly or northerly currents were combined in the proportion of 12 to 15, shewing a predominance of north-westerly winds. The quantity of moisture in air was large. The mean degree of humidity, 78. The rainfall was not heavy, it measured 2·75 inches. The greatest rainfall in one day was 0·60 inch on the 7th. Rain fell on 14 days.

In October the Barometer was low and oscillated perpetually through limits nearly reaching one inch and a half. The maximum height was 30·53 on the 28th, and the minimum 29·05 on the 23rd, shewing a range of 1·48. The instrument stood below 30 inches on 19 days. The Temperature varied from 9deg. in excess to 9deg. below the usual value. The highest reading of Thermometer was 68deg. on the 1st, 2nd, and 3rd, and the lowest record 28deg. on the 28th and 29th, giving a total range of 40deg. The greatest daily range was 23deg. on the 14th and 16th, the least variation 4deg. on the 10th and 11th, the mean daily range 14·4deg. The mean heat of the month was 49·5deg., which is a half a degree below the average. The general direction of wind was more or less westerly on 23 days, and easterly on 7, with these quarters southerly and northerly currents were combined in proportions of 12 to 19, being a preponderance of north-westerly winds. The quantity of moisture in the air was was large and ranged from 98 to 59. The mean degree of humidity was 86. The rainfall of the month was heavy, and exceeded all the months of the year but that of January. It amounted to 4·42 inches, the greatest rainfall in one day was 0·91, this occurred on the 22nd. Rain fell on 24 days.

The Barometer in November also was very fluctuating and oscillated through limits exceeding one inch and a quarter. The maximum was 30·50 attained on the 17th, the minimum 29.23 on the 1st, giving a range 1·27. The instrument stood below 30 on 16 days. The temperature of November was unusually mild, the highest reading of the Thermometer was 57deg. on the 23rd, the lowest 29deg. on the 21st, being a total range of 28 degrees. The greatest daily range was 25deg. on the 21st, the least 1deg on the 11th, the mean daily range 8·7deg. The mean heat of the month was 45·4deg., which is 2·3deg. above the average. The general direction of the wind was more or less westerly on 14 days, and easterly on 16. With these quarters, southerly and northerly currents were combined in the proportion of 14 to 16. The quantity of moisture in the air was large, and varied from 71 to 98; the mean degree of humidity 86. The rainfall of November was not heavy; total rainfall 2·29 inches; the greatest in one day 0·72 inches on the 5th; Rain fell on 14 days.

In December the Barometer was above 30 inches on 28 days. The maximum height was 30.66 on the 12th and 13th, the minimum 29.61 on the 31st, giving a range of 1.05. The temperature was mild and in excess of the mean on 21 days. The highest reading of Thermometer was 54deg. on the 1st, 2nd, and 16th, the lowest 20deg. on the 11th, showing a total range of 34deg. The greatest daily range was 19deg. on the 1st, the least was 2deg. on the 4th, the mean daily range was 9·7deg. The mean heat of the month was 42·2deg. which is 2·4deg. above the average. The general direction of the wind was more or less westerly on 25 days, and easterly on 6. With these quarters southerly and northerly currents were combined in the ratio of 5 to 23. There was a great preponderance of westerly winds. The quantity of moisture in the air was considerable, varying from 85 to 100. The mean degree of humidity was 93. The rain fall was moderate, the total being 1·16 inches; the greatest rainfall in one day was 0·30, this was on the 19th. Rain fell on 12 days.

The Rainfall in Cardiff in 1873, observed by Mr. W. Adams:

Month.	Total Depth.	Greatest Fall in 24 hours.		Days on which ·01 or more fell.
		Depth.	Date.	
January ...	4·76	0·91	11th	21
February ...	1·17	0·30	24th	8
March ...	3·60	0·57	6th	17
April ...	0·39	0·26	17th	8
May ...	2·72	0·66	4th	14
June ...	1·93	0·87	29th	13
July ...	4·03	0·96	25th	17
August ...	3·66	0·70	31st	17
September ...	2·75	0·60	7th	14
October ...	4·42	0·91	22nd	24
November ...	2·29	0·72	5th	14
December ...	1·16	0·30	19th	12
	32·88			179

The following is a statement of rainfall in Cardiff during five years ending 1873 :—

Years.	Total fall.	Days on which ·01 or more fell.
1869	38·24	179
1870	35·24	114
1871	37·01	172
1872	50·36	231
1873	32·88	179

The average rainfall yearly on the five years, has been 38·74 inches; the lightest rainfall, was during the last year, 1873, when it was 32·88 inches, or, 5·86 below the average.

THE WATER SUPPLY.

The water supply is obtained from two sources, the chief being that from the mountain springs near Lisvane; the other is from the river Ely. The latter is, however, supplementary to the first, and is used only at times, when prolonged dry weather has rendered it necessary.

The channels of the gathering grounds at Lisvane are received into the reservoir immediately at the base of the hills before these can be contaminated by any proximity of dwellings. The capacity of this reservoir is 72,000,000 gallons. There are also three other storage works, capable of holding 5,000,000 gallons. In view of the rapidly increasing population supplied by the Water Company, the directors have determined to increase their storage works, so as to contain 100,000,000 gallons, with as little delay as possible.

Immediately on leaving the reservoir the water passes through extensive filter beds, and from these direct into the aqueduct leading to the distributing conduits. The aqueduct and distributing conduits are made of cast-iron pipes. The water, after it leaves the filter beds, cannot be contaminated before it enters the service pipes.

1,750,000 gallons of water are delivered daily into the distributing conduits; this supply being equal to 30 gallons per head of the combined population of Cardiff, Roath, Canton, and Penarth.

Dr. Parkes gives as the quantity which ought to be supplied to each inhabitant of a district for ordinary domestic purposes, 12 gallons. He then adds for baths, water closets, wastes, municipal purposes, and trade purposes, 23 gallons—making a total of 35 gallons per head. This, however, is considered excessive, and the ordinary average necessary is believed to be 20 gallons.

The water supply to certain towns with considerable populations is as under :—

The several London Water Works Companies	from 21 to 34 gallons.
Southamption	35 „
Edinburgh	35 „
Liverpool	30 „
Sheffield	20 „
Derby...	14 „

I may here observe that the water supplied to Cardiff for municipal purposes is used only for watering the streets, flushing the courts, and a limited section of the public sewers, namely, those below the junction canal at Bute Street. The others, comprising the majority, are flushed from a reservoir, supplied by independent sewers near the Cardiff Arms Hotel.

The present supply, therefore, may be considered abundant. It is arranged on the constant principle, flowing from the reservoir at a steady and uniform rate.

In August, by your direction, I was instructed to forward to Dr. Hassal, for analyzation, two samples of water, supplied to the town. I therefore sent him those selected from the public fountain near St. John's Church, and from the Cathedral Road. The following is the report of the analysis made by him. The two samples are practically the same. I therefore introduce the analysis of the water obtained from the public fountain near St. John's Church.

The analysis of water No. 1 supplied to Dr. Hassal, Analytical Chemist, by Dr. Paine.

	Grains per gallon.
Total solid residue...	18·4100
Chlorine	1·0650
Free Ammonia	0·0008
Albuminoid Ammonia	0·0126
Ammonia from Nitrates or Nitrites	0·0364
Nitric Acid...	0·1394
Oxygen required for Oxidation	0·0717

Permanent hardness... ...	6·50	degrees.
Temporary	8·45	„
Total hardess ...	14·95	„

Dr. Hassal then observes that the result is of a favourable character.

VITAL AND MORBID STATISTICS.

The births registered in Cardiff during the four quarters of the year 1873, were

For the Quarter ending	March	386
... ...	June	333
... ...	September	344
... ...	December	370
	Total,	1,433

The birth-rate for the year in Cardiff has been 34·5 to every 1000 inhabitants; that of all England 35·6; but this calculation does not represent the correct birth-rate of Cardiff, inasmuch as the estimated population on which it is based includes upwards of 4000 seamen constantly in the port, whose families reside elsewhere and therefore do not contribute to the birth-rate.

The deaths registered during the same period, were

	Males.	Females.	Total.
For Quarter ending March	146	111	257
... ... June	113	88	201
... .. September	112	89	201
... ... December	117	109	226
	488	397	885

The following table gives the estimated population; the area of the district; the number of persons to each acre; the number of births, and the number of deaths to every 1000 inhabitants.

Estimated population 1873.	Area of district in acres.	Number of persons to each acre.	Number of births to every 1000 pop.	Number of deaths to every 1000 pop.
41,510	2,155	19	34·5	21·3

The death-rate of Cardiff during the year, as compared with the death-rate ruling the kingdom.

Quarters ending	March	June	September	December	The Year.
All England	23·0	20·4	19·4	21·8	21·2
189 Chief Towns	24·4	21·6	22·0	24·7	23·2
Cardiff	24·7	19·3	19·3	21.7	21·3

According to this analysis the town of Cardiff bears a very favourable comparison—the death-rate being only a decimal above that of all England, which includes town and rural districts; while it shows two deaths per 1000 less than the average of the chief towns.

It will be seen to be still more conclusively favourable by carrying out the comparisons with four other important seaport towns whose respective populations are somewhat analogous to each other.

Quarter ending	March	June	September	December
London ...	22·7	20·0	21·8	25.3
Bristol ...	24·7	23·4	21 5	22·7
Liverpool	27.5	24·1	27·1	25·0
Newcastle	29·4	27·0	29·9	35·4
Cardiff ...	24·7	19·3	19·3	21·7

The following table illustrates the registered causes of death in Cardiff during 1873, with number of deaths from each specified cause to every 1000 living, as contrasted with the like mean annual rate ruling all England during a period of five years.

1873

		Disease.		Total Deaths.	Cardiff, number of deaths from specified causes, to every 1000 living.	All England mean annual deaths to each specified cause, for every 1000 living, for Five years.
Zymotic or Infectious Diseases.	Miasmatic Diseases.	Small Pox	...	8	·192	·147
		Measles	...	2	·048	·451
		Scarlet Fever	...	4	·096	·856
		Diphtheria	...	6	·144	·145
		Quinsy ...	...	4	·096	·011
		Croup ...	...	15	·361	·230
		Whooping Cough	...	19	·457	·532
		Fever ...	...	27	·650	·934
		Erysipelas	...	4	·096	·084
		Dysentery	...	1	·024	·048
		Diarrhœa ...	...	37	·890	1·038
		Rheumatism	...	4	·096	·116
				131	1·107	4·885
Constitutional Diseases.	Diathetic Diseases.	Syphilis ...	...	8	·192	·032
		Stricture ...	...	3	·072	·010
				11	·264	·093
	Dietic Diseases.	Purpura ..	...	1	·024	·021
		Alcoholism	...	5	·120	·039
				6	·140	·132
	Tubercular Diseases.	Dropsy ...	...	1	·024	·326
		Cancer ...	...	21	·505	·404
		Mortification	...	2	·048	·063
				24	·578	·819
		Scrofula ...	...	6	·144	·135
		Tabes ...	...	19	·457	·315
		Phthisis ...	...	149	3·587	2·527
		Hydrocephalus ...	...	9	·216	·346
				183	4·408	3·326
	Diseases of Brain and Nervous System.	Cephalitis	...	17	·409	·203
		Apoplexy ...	...	10	·240	·495
		Paralysis ...	...	16	·385	·505
		Insanity ...	...	1	·026	·030
		Epilepsy ...	...	4	·096	·114
		Convulsions	...	38	·915	1·247
		Brain Diseases	...	10	·240	·258
				96	2·310	2·859
	Diseases of Re-spiratory Organs.	Pericarditis	...	2	·048	·027
		Aneurism ...	...	1	·024	·024
		Heart ...	...	47	1·132	1·028
				50	1·204	1·080
		Laryngitis	...	4	·096	·066
		Bronchitis ...	...	68	1·638	1·839
		Pleurisy ...	...	2	·048	·042
		Pneumonia ...	...	4	·096	1·073
		Asthma ...	...	36	·867	·171
		Lungs ...	...	7	·168	·225
				121	2·910	3·418
	Diseases of Di-gestive Organs.	Gastritis ...	...	2	·048	·035
		Enteritis ...	...	1	·024	·141
		Peritonitis ...	...	6	·144	·079
		Ascites ...	...	1	·024	·033
		Ileus ...	...	1	·024	·057
		Stomach ...	...	3	·072	·137
		Hepatitis ...	...	2	·048	·064
		Jaundice ...	...	3	·072	·072
		Liver ...	...	5	·120	·265
				24	·578	1·005
	Diseases of Urinary Organs.	Bright's diseases	...	12	·289	·100
		Diabetes ...	...	1	·024	·032
				13	·313	3·020
Local Diseases.	Diseases of Female Genital Organs.	Uterus ...	...	1	·024	·059
				1	·024	·059
	Diseases of Integumentary Tissue.	Joints ...	...	3	·072	·084
				3	·072	·084
	Diseases of Locomotor System.	Phlegmon ...	...	7	·168	·023
		Ulcer ...	...	2	·048	·019
		Skin, &c ...	...	1	·024	·017
				10	·240	·060
	Diseases of Children.	Premature Birth	...	15	·361	·416
		Spina Bifida	...	6	·144	·019
		Teething ...	...	12	·289	·022
				33	·794	·680
	Diseases of Adults.	Paramenia ...	...	2	·048	·005
		Childbirth	...	7	·168	·110
				9	·216	·112
Diseases of Decrepitude, Old People.		Age ...	...	37	·890	1·297
				37	·890	1·297
Accidental Deaths.		Atrophy and Debility ...		46	·105	1·371
				46	·105	1·371
		Fracture ...	...	2	·048	·310
		Gun-shot wound	...	1	·024	·005
		Scalds and Burns	...	4	·096	·122
		Drowning ...	...	22	·529	·130
		Otherwise ...	...	26	·626	·049
				55	1·324	·696
		Manslaughter	...	1	·024	·020
				1	·024	·020
		Stabs and Cuts ...		1	·024	·013
		Poison ...		1	·024	·013
				2	·048	·060
		Causes not defined		29	·698	·153
				29	·698	·153
		TOTAL	...	885	21·320	22·760

The first-class in this table consists of diseases, which science and experience declare to be due to preventible causes. They are frequently developed, and always intensified in districts where sanitary provisions are neglected.

There are few towns in the kingdom, which illustrate such conclusive results with greater force than Cardiff. Previous to 1849 the town was practically without drainage, the few sewers which existed were for the purpose of carrying off surface water and slops. The cess-pools were sunk into a gravel subsoil, which from its porosity, freely permitted their liquid contents to percolate, and pollute the wells in a marked degree. Mr. Clinton, the then Town Surveyor, stated in evidence, before a commissioner appointed by the General Board of Health to report on the sanitary coudition of Cardiff, that "there was not a single well in the populous part of the town, where pure water was to be found." The mortality of the town was so great that the deaths exceeded the births during the 7 years immediately preceeding 1849. The total deaths registered were 2532, the births 2432, and the death-rate was as high as 30 per 1000 population. The town after this date commenced its sanitary reform. Effective drainage was carried out, and wholesome water supply obtained, such as I have described, and as these two essentials for health preservation were carried out, a marked improvement took place, the births rapidly exceeded the deaths, and have for several years been upwards of 60 per cent. in excess—the death-rate concurrent with it falling on more than one occasion below 18 per 1000, and rarely exceeding 22 per 1000. When this height is attained, it is due to zymotic diseases of a special class, such as infantile epidemics which from time to time prevail, and which then disturb the death-rates in a sensible degree. The great importance of these health provisions forces itself practically on our convictions, that during the year 1873 taken singly, 328 lives have been saved, which had the same excitant causes of disease existed as previous to 1849 would have been sacrificed.

The deaths from the zymotic class of diseases in this town during 1873 were 148; the death rate being 3·565 per 1,000. The mean annual death rate of the Kingdom for the last quinquennial period, published by the Registrar General, beiug 5·171.

The first disease in this class to which I have to call your attention is small-pox. This was fatal during the year in 8 cases, these were registered as follows:

Deaths from Small-pox.

Date.	Sex.		Age.	Locality.	Occupation.
	M.	F.			
January 27 ...		1	7 years	Nelson Street	Cabdriver's child
February 4 ...		1	6 years	Peel Street	Collier's child
March 15		1	24 years	Hospital	Labourer's child
„ 26		1	50 years	Bute Esplanade	Shipwright's wife
„ 29	1		30 years	Hospital	Seaman
April 15	1		4 weeks	George Street	Baker's child
May 23	1		23 years	Hospital	Seaman
September 11 ...	1		12 years	Hospital	Mason's child

The last death reported was after an intreval of some months; 31 other cases were also brought under my notice. These all terminated favourably; all the cases were antecedent to September 11th, when the discase may be said to have ceased as an epidemic.

The following is the history of this epidemic which has prevailed in this town, continuous for the period of two years and nine months.

The first case coming under observation was that of a woman who came down from London to join her husband who resided in Tyndall Street. She was ill on arrival, and in a day or two, small-pox in a confluent form made its appearance, of which disease she died. A second case occurred in this house, but terminated favourably. No subsequent case occurred either in the house or neighbourhood. In April a poor man residing in Broad Street contracted the disease from a family in Ely Road, Llandaff, where small-pox in a severe form prevailed. These were the only cases among the residents of the town, but during the year 42 cases among seamen were removed from the shipping into the Hamadryad Hospital, 8 of these were fatal In order to prevent the introduction into the town of the disease, great vigilance was exercised over the shipping by the Custom House officials, and by the authorities at the docks, all vessels suspected to be infected were reported to me, and communication with those on board was limited to the smallest extent compatible with the business requirements of the ship.

Towards the latter part of the year the authorities of the town were informed that the accommodation for small-pox in the Hamadryad was becoming inadequate to the demands made on it by the shipping which arrived in the port with sick sailors on board, and it was feared that if this failed, small-pox would be introduced into the seamen's boarding-houses and the health of the town imperilled, at the same time it was known that small-pox to a serious degree existed in neighbouring rural districts. A building was immediately erected contiguous to the Hamadryad Hospital, and an arrangement was entered into, that small-pox cases from the town should be admitted under certain conditions, if such an arrangement should become necessary.

A strict supervision was maintained over all lodging-houses, but especially those frequented by tramps, and any case of sickness coming from infected districts, or others, were medically examined, and, if necessary removal to the small-pox hospital urged, a request which for a considerable time was invariably complied with, the cases being chiefly confined to a class amenable to pressure. The town under these precautions enjoyed great immunity until March, which concluded a period of one year and three months. At this time, however, there were two or three cases in which strangers recently arrived from the Rhondda Valley, where the epidemic prevailed, were found suffering from small-pox in Charlotte Street, and the disease broke out with great force in this locality. Application was immediately made to the Board of Guardians that a detached building connected with the Union House should be appropriated to the reception of small-pox cases

among the pauper classes, other cases as heretofore being removed to the Hamadryad. This being complied with, 6 cases were on one day removed from Charlotte Street and two days after 3 more, with great advantage to the public, as no other cases occurred in this locality.

To meet the exigencies of the occasion. I immediately placed myself in communication with the whole of my professional brethren, to whom I am personally indebted and the town greatly benefitted by the cordial co-operation I received from them in all measures considered practicable to mitigate the severity of the epidemic. Every case coming under individual observation was reported to me, and the services of Inspector James were placed at the disposal of the medical attendant whenever required, and these were very frequently made available. Great advantages resulted from this step. Information was immediately given to the vaccination officer, and at my request the Board of Guardians temporarily appointed two deputies to assist that officer in the discharge of his duties; infected houses, and houses adjoining were visited, vaccination, and re-vaccinatiou was urged with success. The public vaccinator, Mr. Hier Evans, appointed additional days to be at his station, and when requested, with as little delay as possible visited an infected house in which any members of the family required the operation to be preformed.

Throughout the whole period during which the epidemic lasted wherever it was practicable and the object could be attained, removal to one of the small-pox hospitals was effected, a proper ambulance being obtained, 81 cases were removed into the Hamadryad, and 83 cases into the hospital at the Union Workhouse from the town, also 15 from the neighbouring districts. In one instance compulsory removal was effected (under sec. 26. of the Sanitary Act, 1866) by the Magistrates, the patient being without proper lodging and accommodation. In another instance, a body of a case of small-pox was removed to the dead-house (uuder the sec. 27 of the same Act), as it was being retained in a room in which persons lived and slept.

Disinfecting remedies were freely afforded to any one making application for such, these were M'Dougal's Powder, Condy's Fluid, and carbolic acid.

After the termination of a case, the room and clothing were fumigated whenever desired by Inspector James. This operation was performed alternately by sulpher fumes and the evolution of chlorine gas by the admixture of sulphuric acid, chloride of sodium, and binoxide of manganese.

It is satisfactory to know, that while 386 cases of small-pox came under observation, only in 31 instances was the second member of a family taken ill with the disease.

The following is an analysis of the extent to which the disease prevailed during the period of its existence in Cardiff, with its results.

Year.	Under treatment in Hamadryad Hospital.	Under treatment at Small-pox Hospital at Union.	Under treatment in Private Residence.	Total.	Deaths.	Recoveries.
1871	42	10	3	55	9	46
1872	33	103	138	274	46	228
1873	9	4	26	39	8	31
	84	117	167	368	63	305

The following is the mortality at the two hospitals and in private residences:

	Total cases.	Deaths.	Recoveries.	Per centage of Deaths to total Cases.
Hamadryad Hospital	84	11	66	21·3
Small-pox Hospital at Union ...	117	24	93	20·5
Private Houses	167	21	146	12·5
	368	63	305	

In estimating the per centage of deaths to recoveries due consideration must be given to the circumstance, that the cases under treatment at the Hamadryad Hospital and at the small-pox hospital at the Union were severe cases, and a large proportion in the confluent form, requiring for these reasons to be removed to these Institutions; and that those which were treated in private houses were, in very many instances, in a modified form, and, therefore, less severe, hence the difference in result.

DEATHS AT DIFFERENT AGES FROM SMALL-POX.

Under 5 years of age.	Above 5, under 10 years.	Above 10, under 15 years.	Above 15, under 25 years.	Above 25, under 35 years.	Above 35, under 45 years.	Above 45, under 55 years.	Above 55, under 65 years.
9	10	3	19	13	5	2	2

Of the total deaths it will be seen that 9 occurred under 5 years of age, 2 of these being 6 weeks, and 22 under 15 years, while 43 were above that age.

The small number of deaths among the infantile population in a town where the total population is 41,510 is satisfactory, as illustrating the protective efficacy of vaccination for a limited period; and the necessity of re-vaccination cannot be too strongly urged. Its value was again and again recognized in houses where a case of small-pox showed itself, as the rare occasions in which the disease extended demonstrated, and the frequency with which those who had been vaccinated in early life, who, again on re-vaccination passed satisfactorily through its stages, indicated a susceptibility of small-pox, the attack of which had been prevented by the prophylactic operation.

The great number of seamen who suffered from the disease, and the length of time which elapsed before the disease spread among the in-

habitants—namely, one year and three months—proves the great advantage accruing from the sanitary supervision which was exercised over the shipping, and to which I have alluded in the earlier part of this report.

Among the 117 cases treated in the Small-pox Hospital at the Union, 21 were received in that Institution from the rural parishes. These were as follows: from Roath, 9, Canton, 7, Llandaff, 1, Penarth, 2, The Ton, 1; and Whitchurch, 1.

It is due to Dr. Sheen to state that during the whole of the time small-pox cases were received into, and treated in that Institution, so excellent and perfect were his arrangements that although it was closely adjacent to the Union Workhouse containing on an average 310 inmates, only 2 were taken ill with the epidemic.

The following statement furnished me by Mr. Hier Evans shews the total number of cases of vaccination and re-vaccination, which were successfully performed by him either at the vaccination station, or in private houses when desired to do so by the Vaccination Officer.

	1871	1872.	1873.
Primary Vaccination	649	954	587
Re-vaccination	94	341	9
	743	1295	596

The following is a return given me by Mr. R. R. Watkins, Vaccination Officer, of the number of children in the parishes of St John's and St. Mary's, Cardiff, who have been successfully vaccinated, of the insusceptible cases, and of the deaths before vaccination could be performed; where the papers have been remitted for the year 1873. It must, however, be understood that the whole of the papers for the last quarter had not been received when the return was made.

Successfully Vaccinated.	Insusceptible.	Deaths.	Total.
945	2	132	1,079

The mortality from infantile epidemic diseases throughout the year has been very light. Only 2 deaths were registered from measles, 4 from scarlatina, 15 from croup, and 19 from whooping cough, all these were considerably below the average with the exception of croup, this was very slightly in excess.

Diphtheria was fatal in 6 cases, all of which were those of children under 10 years of age; and were registered as follows:— 3 in Febuary, namely 2 female twins in Hannah Street, aged 1 year, and 1 male in North William Street, aged 18 months; 1 in March, a female aged 21 months, residing in St. Mary Street; 1 in August, a male aged 9 years, residing in Gough Street; and 1 in October, a female, aged 3 months, in David Street. The deaths from Diphtheria in Cardiff were at the rate of 0·144 per 1,000, that of the Kingdom 0·145.

Twenty-seven deaths were registered from fever, being at the rate of 0·650 per 1,000, as against 0·934, the death rate from fever ruling

the Kingdom. A considerable diminution in the number of deaths from fever has been observed in Cardiff of late years, due to the effective drainage and improved water supply, to which I have alluded in the earlier part of this report.

It is very satisfactory to know that fever is rarely found now in the streets from which formerly that disease was never absent. I mean Stanley Street, Love Lane, Landore Court, and others of this description. Only 5 deaths from fever have been registered in the populous districts where the lodging-houses exist, and where the Irish labourers and their families reside, although this class of inhabitant of Cardiff exceeds 10,000. On one occasion only has a second death from fever been registered in the same house or street, this occurred in Rowe Square, where a man and his wife died in November, closely adjacent to the house where these resided were two privies in a very unsatisfactory state, owing to defective drainage, these were reported to your Board at that time, as the probable excitant cause of the disease; since then, they have been kept in better order, by frequent flushing, but as this remedy is dependent on the care of the occupiers of the houses using them, no permanent improvement can be relied upon, until the property is connected with the public sewers.

The deaths registered from fever, were registered at the undermentioned ages :—

	Under 5 years	...	...	7
Above 5 years	„ 10 „	...	...	4
15 „	„ 25 „	...	...	5
25 „	„ 35 „	...	...	4
35 „	„ 45 „	...	...	2
45 „	„ 55 „	...	...	4
55	... ...	...	...	1
		Total	...	27

Of these, 11 were registered under 10 years of age, and were probably due to the ordinary remittent fever of childhood. Three of the adults were inmates of the Union.

Diarrhœa produced a mortality of 37 deaths—20 of these were under 1 year of age; 9 between 1 and 2 years; 1 between 4 and 5 years, making a total of 30 deaths under 5 years of age, and the disease in these cases may, therefore, be called infantile diarrhœa, and was caused by the ordinary excitants at this period of life. There were only 7 deaths registered among adults. Twenty-one of the deaths were registered during the summer quarter, ending September 30th.

Among the constitutional classes of disease, Phthisis produced a mortality of 149. The death rate from this disease in Cardiff was 3·587 per 1000, to 2·527 the death rate ruling the kingdom. It was, therefore, greatly in excess. This is probably due, to a considerable extent, to the flatness of the district on which the town is built, especially the southern division, where the subsoil is clay; these two causes produce, great humidity of atmosphere and frequent fogs, these being favourable to the

developement of tubercular disease. To these also must be added, the over crowding of the houses in which the labourers and their families reside,—comprising an unusually large proportion of the population of Cardiff, as compared with other towns. This circumstance produces defective ventilation, and developes cachexy of constitution. Over-crowding, therefore, occupies the constant attention of myself and the Inspector of Lodging-houses, and renders necessary frequent appeals to the Magisterial Bench for penalties to be enforced on parties who fail to comply with the requirements made on medical certificates.

Inflammatory diseases of the pulmonary organs were unusually fatal in the spring and early months of summer, owing to the thermal causes which were then observed.

Diseases of the abdominal viscera were considerably below the average.

Diseases of the kidney and integumentary diseases were slightly above.

Developmental diseases both of children and adults differed but little from the average of the Kingdom.

The same remark applies to violent and accidental deaths, the only noticeable increase in these causes is that which arises from drowning, due to the employment connected with the Docks, and the large amount of shipping constantly in the port.

The deaths registered at Public Institutions were:

	All Causes.	Phthisis.	Zymotic Diseases.		
			Small-Pox.	Fever.	Diarrhœa.
Union	98	25	1	3	9
Infirmary	37	2			1
Hamadryad Hospital	24	5	4	1	
Gaol	2	1			

The deaths at age took place as follows :—

	Males.		Females.		
Under 1 year	100		101		
„ 2 „	41		37		
„ 3 „	10		10		
„ 4 „	8		7		
„ 5 „	10		8		
		169		163	
„ 10 „	12		11		
„ 15 „	17		9		
„ 25 „	48		25		
„ 35 „	45		37		
„ 45 „	51		47		
„ 55 „	62		30		
„ 65 „	50		29		
„ 75 „	25		21		
„ 85 „	7		16		
„ 95 „	2		9		
		319		334	
	488		397		885

The following is an analysis of the deaths at age, with the rate of mortality at certain periods.

Total deaths.	Deaths under 1 year.	Deaths under 5 years.
885	202	332

The rate of mortality according to age in Cardiff, compared with that of all England, is as follows :—

	Per centage deaths to total births.	Per centage deaths under 1 year to total births.	Per centage deaths under 1 year to total deaths
All England.....	59·38	17·40	27·02
Cardiff	61·65	14·07	22·82

From this it will be seen that the per centage of deaths to total births is greater in Cardiff than the average of the kiugdom. This may be explained to some extent by the fact that the 4,000 seamen yield a relative proportion to the adult death rate, but do not to the birth rate. But the infant mortality is greatly in favour of Cardiff this year, owing to the comparative immunity from the ordinary infantile epidemics which the town has enjoyed.

DUTIES OF THE SANITARY INSPECTOR.

Having thus enumerated the various matters which are considered to pertain to the sanitary condition of Cardiff, I have to report that apart from those, already incidentally alluded to, Inspector James discharged the following duties under my supervision.

7,300 day, and 5,475 night visitations to the various lodging-houses were made during the year. 86 occupiers of houses were served with notices to reduce the number of inmates in consequence of over-crowding and the houses being otherwise in an improper state. 67 were summoned for non-compliance with the requirements mentioned in their notices. 22 were fined in penalties varying from 5s. to 40s., the others being excused on promising to abate the evil, but were for some time kept under observation.

488 occupiers on making application were supplied on loan with brushes and materials for limewashing.

130 notices were served on occupiers to remove stagnant water, manure, and other refuse matter, from back yards, and 23 notices were served to remove animals improperly kept on their premises.

161 closets and drains connected with houses, 93 drains connected with out-premises, were reported as being choked up, and otherwise in an improper state.

127 Houses were fumigated and disinfected personally by the inspector according to my instructions, and 95 occupiers were supplied with materials for this purpose, instructions being given how to use them.

Seven ships were reported as having arrived with sickness on board of an infectious character. The sick were removed to the hospital and the vessels properly fumigated.

Four chests of clothes, and 8 bags of clothes, were received from the Custom-house Authorities belonging to deceased seamen who had died on board of vessels from infectious disease while on voyage—these were thoroughly disinfected and returned to the Custom-house.

2094 lbs. of meat, and 35 boxes of fish were seized and destroyed by order of magis trates as being unfit for food; 11 parties were summoned for having these in their possession, for purposes of sale, and were fined in penalties varying from 10s. to £10.

Inspector James discharged these duties most satisfactorily, and in concluding this report it is but due to him to state, that on all occasions while acting under me, he has evinced great zeal and ability, and never more so than when his services have been required to assist in preventing the spread of epidemic disease, especially on the occasion of the recent visitation of small-pox.

I have the honor to be, Gentlemen,
Your obedient Servant,

H. J. PAINE, M.D.,
Medical Officer of Health.